FAX/DATA MODEM
USER'S MANUAL

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i.1 FCC General Information

The Federal Communications Commission (FCC) of the United States restricts specific uses of modems, and places registration responsibilities on both the manufacturer and the individual user:

1. The modem may not be connected to a party line or to a coin operated telephone.

2. The modem manufacturer must make any repairs to the modem to maintain valid FCC registration.

3. Notification to the telephone company is no longer required prior to connecting registered equipment, but upon request from the telephone company, the user shall tell the telephone company which line the equipment is connected to as well as the registration number and ringer equivalence number of the registered protective circuitry. FCC information is printed on a label on the bottom of the modem.

i.2 FCC Notice

This equipment has been tested and found to comply with the limits for a digital device, pursuant to Subpart B of Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installed and used the instructions, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a curcuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Shielded interconnect cables and a shielded power cord must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

NOTE : The manufacturer is not responsible for any radio or T.V. interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

i.3 DOC Notice

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage or the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

1 - COMMAND REFERENCE

This chapter provides an alphabetized reference with examples for all commands for the modem. The system of commands is depicted below in Figure 1-1.

To use these commands for dialing or configuring the modem, make sure the communications software package you will be using lets you operate the modem through its internal commands. If your software permits use of the modem's internal commands, read this chapter. If not, read your software user's manual and ignore the rest of this manual.

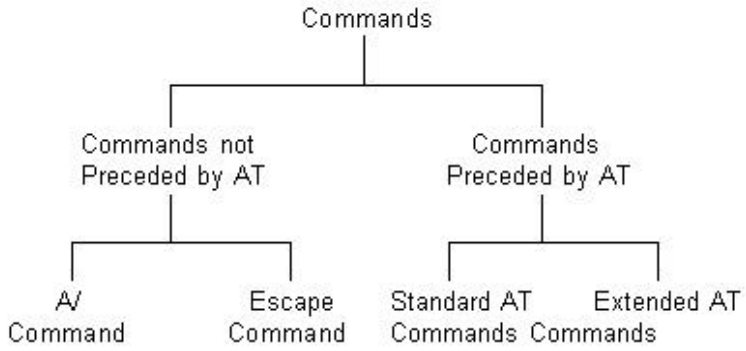

Fig.1-1 System of Commands

1.1 General Command Information

Except for the **A/** command and the **+++** escape command described in Section 1.4, all commands must be prefixed with the attention code **AT**. For instance, the **A** command (below) would be entered as: "**AT A<CR>**". Without the AT prefix, the command line cannot be executed. Once entered, AT cannot be deleted with the **Backspace** or **Delete** key.

More than one command can be placed on a single line and, if desired, separated with spaces for readability. Once the carriage return (**Enter**) key is pressed, the command line is executed. A line with no carriage return is ignored.

The modem accepts either upper or lower case characters in the command line and ignores any spaces within or between commands. Typing errors can be corrected with the **Backspace** key. Exceptions are noted in the description of specific commands.

Variables (r and x) are listed in italics. Punctuation symbols (**, ; ! @**) use as dial modifiers are listed alphabetically according to their English names at the beginning of Section 1.3. Where two commands are separated by a slash, either command will have the same effect. For example, if the command is listed as **B0/B**, issuing either **B0 or B** will have the same effect.

1.2 AT Commands

A Go On-line in Answer Mode

This command instructs the modem to go off-hook immediately and then make a handshake with the remote modem. Handshaking is not available during leased line operation.

A is usually used to manually answer an incoming call or to switch from voice conversation to data communication.

Bn Select Protocol to 300 bps or 1200 bps

B0/B Selects ITU-T 300 or ITU-T 1200 protocol once the command line prefix **AT** has been entered at the 300 bps or 1200 bps data rate.

B1 Selects BELL 300 or BELL 212A protocol once the command line prefix **AT** has been entered at the 300 or 1200 bps data rate. (default)

B2 Selects ITU-T V23, originate mode will transmit data at 75 bps and receive data at 1200 bps. Answer mode will transmit data at 1200 bps and receive data at 75 bps. The command N0 (Disable auto mode) must be selected.

Cn Carrier Transmit Control

Controls the transmit carrier. The modem is preset to turn carrier on and off as necessary (the C1 option). The signal is on when the modem is calling, or connected to a remote modem, and is off when it is not. The C0 option is NOT valid.

C0 Not permitted; returns ERROR result code.

C1 Normal transmit carrier switching (preset).

D Go On-line in Originate Mode

D instructs the modem to go off-hook immediately and automatically dial the number contained in the dial string following **D**. The dial string may contain any of the dial modifiers contained in the following section. The **D** command without a dial string is usually used to switch from voice conversation to data communication or to call a remote modem in leased-line operation mode.

En Command Echo

E0/E Disables command echo.

E1 Enables command echo. (default)

Hn Hang Up

H0/H Goes on-hook. (hangs up)

H1 Goes off-hook. (ready to dial)

In Identification

I0/I Report the product code.

I1 Report the hardware checksum.

I2 Report "OK".

I3 Report firmware revision.

I4 Report OEM defined identifier string.

Mn Monitor Speaker On/Off

M0/M Speaker is always off.

M1 Speaker is off while receiving carrier. (default)

M2 Speaker is always on.

M3 Speaker disabled while dialing or receiving carrier.

Nn Automode Enable

N0 Automode detection is disabled.

N1 Automode detection is enabled. This command is equivalent to **F0**. (default)

On Return to On-Line Data Mode

O0 Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (**+++**).

O1 Enters on-line data mode with a retrain before returning to on-line data mode.

Q Result Code Display

Determines whether the modem sends the result codes to the DTE.

Q0 Allows the modem to send result codes to the DTE.

Q1 Prohibits the modem from sending result codes to the DTE.

Sn Reading and Writing to S Registers

Sn? Return the value of register n.

Sn=m Set register n to value m.

T Set Tone Dial as Default

Causes the modem to assume that all subsequent dial commands are tone dial.

Vn Select Word or Digit Result Codes

V0/V Displays result codes in digital format.

V1 Displays result codes in verbose format. (default)

Wn Negotiation Progress Reporting

An additional set of result codes can be enabled with the W command to report progress of the negotiation phase of error-correction mode. These codes report the carrier speed (300 bps - 2400 bps) and the error correction protocol. These messagescan also be reported in either numeric or verbose form. For example, both 77 and PROTOCOL:LAP-M indicate that the error correction protocol is LAP-M.

If the error correction link is negotiated and a connection is made, the appropriate CONNECT XXXX message reports another connection speed.

W0 Report DTE speed only. After connection, there will be no message about what Error Correction or Data Compression protocol is in use. (default)

W1 Report DCE speed, Error Correction/Data Compression protocol, and DTE speed.

W2 Report DCE speed only.

Xn Extended Result Codes

This command selects which subset of the result messages will be used by the modem to inform the DTE of the results of commands.

Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a "W" can be placed in the dial string(see D command). Note that the information below is based upon the default implementation of the X results table.

If the modem is in facsimile mode (+FCLASS=1), the only message sent to indicate a connection is CONNECT without a speed indication.

X0 Send OK, CONNECT, RING, NO CARRIER and NO ANSWER. Busy and Dial Tone Detection are disabled.

X1 Send X0 messages and CONNECT speed.

X2 Send X1 messages and NO DIALTONE.

X3 Send X2 messages except NO DIALTONE, BUSY and RING BACK.

X4 Send all responses. (default)

Yn Enables or Disables Long Space Disconnect

Y0/Y Disables Long Space Disconnect. (default)

Y1 Enables Long Space Disconnect.

Zn Reset

Zn, which must be placed at the end of the command line, resets the active configuration of the modem to the stored configuration saved in nonvolatile RAM, hangs up the modem, and clears the command buffer.

Z0/Z Resets the modem and loads stored configuration 0.

Z1 Resets the modem and loads stored configuration 1.

1.2.a Commands Preceded by &

&Cn Select DCD Options

&C0/&C Maintains an ON status for the Data Carrier Detect (DCD). (default)

&C1 Uses the actual state of the carrier from the remote modem for DCD.

&Dn DTR Option

&D0 DTR is assumed on. (default)

&D1 DTR drop causes modem back to command mode without disconnecting.

&D2 DTR drop causes modem to hang up.

&D3 DTR drop causes modem to be initialized; &Y determines which profile is loaded.

&F Fetch Factory Configuration

&F0 Recall factory profile 0. (default)

&F1 Recall factory profile 1.

&Gn Set Guard Tone

&G0 Disable guard tone. (default)

&G1 Enable 550Hz guard tone.

&G2 Enable 1800Hz guard tone on answering modem.

&Kn DTE/Modem Flow Control

Determines how the modem controls the flow of data between the local DTE and the modem. When the modem terminal buffer is nearly full, the modem will either send an XOFF or drop CTS to stop the data flow. When the buffer is nearly empty, the modem will either send an XON or raise CTS to start the data flow.

&K0 Disable DTE/DCE flow control.

&K3 Enable RTS/CTS DTE/DCE flow control. (Default for data modem.)

&K4 Enables XON/XOFF DTE/DCE flow control.

&K5 Enables transparent XON/XOFF DTE/DCE flow control.

&K6 Enable RTS/CTS and XON/XOFF DTE/DCE flow control.

&Sn DSR Option

Determines whether DSR operates in accordance with the EIA-232-D specification or remains ON.

&S0 Force DSR on. (default)

&S1 DSR on at the start of handshaking and off after carrier loss.

&Vn View Configuration Profiles

&V0 Display active profile.

&V1 Display stored profiles.

&V2 Display stored telephone numbers.

&Wn Store the Current Configuration to Nonvolatile RAM

&W0 Writes the current active configuration to profile 0 in nonvolatile RAM.

&W1 Writes the current active configuration to profile 1 in nonvolatile RAM.

&Yn Select the Default Profile

&Y0/&Y Uses profile 0 on power-up. (default)

&Y1 Uses profile 1 on power-up.

&Zn Store Telephone Numbers (n=0to9)

&Zn Store one of four dial strings (including a telephone number) of up to 36 digits in nonvolatile RAM.

For example: to store the telephone number 002852117 to RAM location 1, issue the following command:

Command:**AT&Z1=002852117<CR>**

1.2.b Commands Proceded by \

\An Select Maximum MNP Block Size

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied.The parameter value, if valid,is written to S40 bits 6 and 7.

\A0 64-character max. MNP block size.

\A1 128-character max. MNP Block size. (default)

\A2 192-character max. MNP block size.

\A3 256-character max. MNP block size.

Result Codes:

OK n=0 to 3.

ERROR Otherwise.

\Bn Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command.

In error correction mode,the modem will signal a break through the active error correction protocol, giving no indication of the length.

\B1-\B9 Break length in 100ms units. (Default=3.) (Non-error corrected mode only.)

Result Codes:

OK If connected in data modem mode.

NO CARRIER If not connected or connected in fax modem mode.

Note: When the modem receives a break from the remote modem, break is passed to the DTE as follows:In non-error correction mode direct, the break length is passed; in non-error correction mode normal and in error correction mode,a 300 ms break is passed.

\Gn Modem to Modem Flow Control (XON/XOFF)

Enables or disables modem flow control during a Normal Mode connection. Since Reliable Mode has its own method of flow control, the \Gn command is ignored when error correction is selected.

However, DTE-to-modem flow control remains active during reliable link.

\G0 Disable XON/XOFF flow control (modem to modem). (default)

\G1 Enable XON/XOFF flow control (modem to modem).

\Kn Break Control

Determines the modem's response when a BREAK is received from the DTE or the remote modem, according to the following conditions:

When a BREAK is received from the DTE during Normal or MNP Mode:

\K0,2,4 Modem enters Command Mode (waiting for an AT command) without sending a BREAK to the remote modem.

\K1 Modem clears the terminal and modem buffers.

\K3 Modem does not clear the buffers.

\K5 Modem sends a BREAK to the remote modem in sequence with any transmitted data. (default)

When a BREAK is received from the remote modem during Normal Mode:

\K0,1 Modem clears the terminal and modem buffers.

\K2,4 Modem does not clear the buffers.

\K4,5 Modem sends a BREAK in sequence with any transmitted data.

When a BREAK is received from the DTE during Direct Mode:

\K0,2,4 Modem sends a BREAK to the remote modem.

\K1,3,5 Modem sends a BREAK to the remote modem.

\Nn Operation Mode Control

Selects the operating mode to be used during connection.

\N0 Normal mode; speed control without error correction.

\N1 Plain mode; no speed control and no error correction.

\N2 Reliable mode.

\N3 Auto-reliable mode. (default)

\N4 LAPM error correction only.

\N5 MNP error correction only.

1.2.c Commands Preceded by %

%C Enable/Disable Data Compression

Enables or disable data compression negotiation.The modem can only perform data compression on an error corrected link.The parameter value, if valid, is written to S41 bits 0 and 1.

%C0 Disable data compression.

%C1 Enable MNP 5 compression.

%C2 Enable V.42 bis compression.

%C3 Enable both V.42 bis and MNP 5. (default)

Result Codes:

OK n=0,1,2,or 3.

ERROR otherwise.

%En Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward

Control whether or not the modem will automatically monitor the line quality and request a retrain (**%E1**) or fall back when quality is insufficient or fall forward when line quality is sufficient (**%E2**). Applies to dial-up line only. The parameter value valid, is written to S41 bits 2 and 6. If enable, the modem attempts to retrain for a maximum of 30 seconds.

%E0 Disable auto-retrain.

%E1 Enable auto-retrain.

%E2 Enable auto-retrain and fallback. (default)

%E3 Enable auto-retrain and fast hang up.

%Q Line Signal Quality

Reports the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retain or fallback/fall forward may be initiated if enabled by **%E1** or **%E2**.

1.3 Dial Modifiers

This section describes all of the dial modifiers which are used in dial strings.

@ Answer

"**@**", placed after a phone number, this modifier tells the modem to wait for 5 seconds of silence before dialing the next number in the dial string. **@** is usually used to access a secure computer system that provides a silent answer as permission for further entrance.

, Pause

"**,**", placed anywhere in the dial string, tells the modem to pause for the number of seconds specified by S-register S8 before processing the rest of the dial string.

! Initiate a Hookflash

"**!**", placed anywhere in the dial string, tells the modem to initiate a hookflash, which means to hang up for 0.5 seconds and then go off-hook again before processing the rest of the dial string. This modifier allows access to PBX features like call transferring.

; Return to Command State after Dialing

"**;**", which must be placed at the end of the dial string, returns to the command state after dialing the number placed ahead of it. A long telephone number would overflow the 40 character command buffer if placed all in one command line, so it must be broken into two or more command lines. Each part includes part of the number, and all but the last command line end with the "**;**" followed by a carriage return.

^ Tone Control

Toggles calling tone enable/disable:applicable to current dial attempt only.

L Re-dial Last Number

The modem will re-dial the last valid telephone number. The **L** must be immediately after the **D** with all the following characters ignored.

S Dial a Stored Number

S is used to dial one of four numbers stored in nonvolatile memory. For example, instead of entering a dial string, you can use this command:

Command: **ATDTS=1<CR>**
S=(0-9)

T Touchtone Dialing

T, placed ahead of a number, tells the modem to dial a number using touchtone dialing.

W Wait for Dialtone

W, placed after a number, tells the modem to wait up to 30 seconds to detect a one-second continuous dialtone before dialing the next number. **W** is most often used in a PBX system to wait for the dialtone of an outside telephone line.

1.4 Commands Not Proceded by AT

Two commands, A/ and +++, are neither preceded by the attention code **AT** nor followed by a carriage return.

A/ Repeat Command

A/ repeats the execution of the last command line stored in the command buffer. If the last command line is invalid, the ERROR result code will appear on the screen. Note that **A/** cannot be preceded by **AT**; if it is, ERROR will appear on the screen.

+++ Escape

+++ returns to the on-line command state (command state without breaking the established connection) from the on-line state.

To escape, stop transmitting data, wait at least one escape guard time (the default time is one second), and then enter three consecutive escape characters (the default character is +). After one more escape guard time (one second), the modem returns to the command state and sends the **OK** result code to the screen. Note that the escape command is the only command that can be recognized by the modem in the on-line state; it cannot be recognized in the command state.

1.5 Result Codes

The modem sends a response to the user via the screen after a command is issued. As shown in the figure below, there are two forms for each result code.

Long Form	Short Form	Description
OK	0	Modem successfully executed an AT command
CONNECT	1	A connection established
RING	2	Modem detected an incoming call
NO CARRIER	3	Modem lost or could not detect a remote carrier signal within the register S7 time
ERROR	4	Modem detected an error in an AT command
CONNECT 1200	5	Connection at 1200 bps
NO DIALTONE	6	Modem did not detect a dial tone within 5 seconds after off-hook
BUSY	7	Modem detected a busy tone
NO ANSWER	8	Modem did not detect 5 seconds of silence when using the @ dial modifier in the dial command
CONNECT 600	9	Connection at 600 bps
CONNECT 2400	10	Connection at 2400 bps
CONNECT 4800	11	Connection at 4800 bps
CONNECT 9600	12	Connection at 9600 bps
CONNECT 7200	13	Connection at 7200 bps
CONNECT 12000	14	Connection at 12000 bps
CONNECT 14400	15	Connection at 14400 bps
CONNECT 19200	16	Connection at 19200 bps
CONNECT 38400	17	Connection at 38400 bps
CONNECT 57600	18	Connection at 57600 bps
CONNECT 115200	19	Connection at 115200 bps
CONNECT 2880	20	Connection at 2880 bps
CONNECT 300	21	Connection at 300 bps
CONNECT 1200TX /75RX	22	Connection at transmit 1200/receive 75 bps
CONNECT 75TX /1200RX	23	Connection at transmit 75/receive 1200 bps
CONNECT 110	24	Connection at 110 bps
RING BACK	25	Ring Back signal detected
+FCERROR	+F4	Error occurred in Class 1 fax operation
FAX	33	Fax modem connection established
DATA	35	Data modem connection established

CARRIER 300	40	Carrier rate of 300 bps
CARRIER 1200/75	44	Carrier rate of transmit 1200/receive 75 bps
CARRIER 75/1200	45	Carrier rate of transmit 75/receive 1200 bps
CARRIER 1200	46	Carrier rate of 1200 bps
CARRIER 2400	47	Carrier rate of 2400 bps
CARRIER 4800	48	Carrier rate of 4800 bps
CARRIER 7200	49	Carrier rate of 7200 bps
CARRIER 9600	50	Carrier rate of 9600 bps
CARRIER 12000	51	Carrier rate of 12000 bps
CARRIER 14400	52	Carrier rate of 14400 bps
CARRIER 16800	53	Carrier rate of 16800 bps
CARRIER 19200	54	Carrier rate of 19200 bps
CARRIER 21600	55	Carrier rate of 21600 bps
CARRIER 24000	56	Carrier rate of 24000 bps
CARRIER 26400	57	Carrier rate of 26400 bps
CARRIER 28800	58	Carrier rate of 28800 bps
CONNECT 16800	59	Connection at 16800 bps
CONNECT 21600	61	Connection at 21600 bps
CONNECT 24000	62	Connection at 24000 bps
CONNECT 26400	63	Connection at 26400 bps
COMPRESSION: CLASS 5	66	MNP Class 5 data compression connection established
COMPRESSION: V.42bis	67	V.42bis data compression connection established
COMPRESSION: NONE	69	Connection established without data compression
PROTOCOL:NONE	76	Connection established without error correction
PROTOCOL:LAPM	77	V.42/LAPM error correction connection established
PROTOCOL:ALT	80	MNP 3-4 error correction connection established
CARRIER 31200	90	Carrier rate of 31200 bps
CARRIER 33600	91	Carrier rate of 33600 bps
CONNECT 31200	95	Connection at 31200 bps
CONNECT 33600	96	Connection at 33600 bps
CARRIER 32000	97	Connection at 32000 bps
CARRIER 34000	98	Connection at 34000 bps
CARRIER 36000	99	Connection at 36000 bps
CARRIER 38000	100	Connection at 38000 bps
CARRIER 40000	101	Connection at 40000 bps
CARRIER 42000	102	Connection at 42000 bps
CARRIER 44000	103	Connection at 44000 bps
CARRIER 46000	104	Connection at 46000 bps
CARRIER 48000	105	Connection at 48000 bps
CARRIER 50000	106	Connection at 50000 bps
CARRIER 52000	107	Connection at 52000 bps
CARRIER 54000	108	Connection at 54000 bps
CARRIER 56000	109	Connection at 56000 bps
CARRIER 58000	110	Connection at 58000 bps
CARRIER 60000	111	Connection at 60000 bps
CARRIER 28000	112	Connection at 28000 bps
CARRIER 29333	113	Connection at 29333 bps
CARRIER 30666	114	Connection at 30666 bps
CARRIER 33333	115	Connection at 33333 bps
CARRIER 34666	116	Connection at 34666 bps
CARRIER 37333	117	Connection at 37333 bps
CARRIER 38666	118	Connection at 38666 bps
CARRIER 41333	119	Connection at 41333 bps
CARRIER 42666	120	Connection at 42666 bps
CARRIER 45333	121	Connection at 45333 bps
CARRIER 46666	122	Connection at 46666 bps
CARRIER 49333	123	Connection at 49333 bps
CARRIER 50666	124	Connection at 50666 bps
CARRIER 53333	125	Connection at 53333 bps
CARRIER 54666	126	Connection at 54666 bps

2 - S REGISTER REFERENCE

Your modem has status registers. These registers are memory locations inside your modem which control your modem's operation. You usually do not have to worry about setting any register because the default values work for most applications.

The S registers are summarized in Fig. 2-1, along with their default values. Registers denoted with an " * " may be stored in one of the two user profiles by entering the **&Wn** command. One of these profiles may be loaded at any time by using the **Zn** command.

The factory default values are stored in ROM and are loaded into the active configuration at power-up or by the **Zn** command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values.

The designated default profile can be changed by entering the **&Yn** command, where 'n' is one of the two possible user profiles. The factory defaults can be loaded at any time by entering the **&F** command.

2.1 S Register Summary

The following chart summarizes your modem's registers:

Reg.#	Range	Unit	Default	Dec	Hex	Description
S0	0 - 255	rings	0	00h		Number of rings before auto-answer
S1	0 - 255	rings	0	00h		Ring count
S2	0 - 127	ASCII	43	2Bh		Escape character code
S3	0 - 127	ASCII	13	0Dh		Command terminator (<CR> character)
S4	0 - 127	ASCII	10	0Ah		Line feed character
S5	0 - 127	ASCII	8	08h		Backspace character
S6	2 - 255	seconds	2	02h		Wait time for blind dialing (Default)
S7	1 - 255	seconds	50*	32h		Wait time for carrier after dial
S8	0 - 255	seconds	2*	02h		Pause time for comma (dial delay)
S9	1 - 255	1/10 sec.	6*	06h		Carrier detect response time
S10	1 - 255	1/10 sec.	14*	0Eh		Lost carrier to hang-up delay
S11	50 - 255	1/1000 sec.	95	5Fh		DTMF Tone Duration
S12	0 - 255	1/50 sec.	50*	32h		Escape code timing
S13		Reserved				
S14		Reserved				
S15		Reserved				
S16		Reserved				
S17		Reserved				
S18	0 - 255	seconds	0*	00h		Test mode timer
S19		Reserved				
S20		Reserved				
S21		Reserved				
S22		Reserved				
S23		Reserved				
S24		Reserved				
S25	0 - 255	seconds	5*	05h		Dalay to DTR
S26		Reserved				
S27		Reserved				
S28		Reserved				
S30	0 - 255	10 s	0*	00h		Disconnect Inactivity Timer
S32	0 - 255	ASCII	17	11h		XON Character
S33	0 - 255	ASCII	19	13h		XOFF Character
S34	0 - 13		13*	0Dh		V.34 Data Rate(bit-rate) (Default)
S35	0 - 5		0	00h		V.34 Symbol RAte(baud-rate)
S36		Reserved				
S37			0*			Desired DCE Speed
S38	0 - 255	seconds	20*			Delay before forced disconnect (Default)

S39		Reserved			
S40		Reserved			
S41		Reserved			
S42		Reserved			
S43		Reserved			
S44		Reserved			
S45		Reserved			
S46		Reserved			
S47		Reserved			
S48		Reserved			
S82		Reserved			
S86				Call Failure Reason Code	
S91 Attenuation	0 - 15	dBm	11	0Bh Level	PSTN Transmit

Fig. 2-1 S-Register Summary

2.2 Glossary of the S Registers

S0 Number of Rings Before Auto Answer

S0 determines the number of rings that must be received before the modem automatically answers an incoming call. For example, when **S0=3**, the modem automatically answers after the third ring. When **S0=0**, the modem does not automatically answer an incoming call; it stays on-hook until the **A** command is issued manually to answer the incoming call.

Range: 0 - 255 rings
Default: 0

S1 Ring Count

S1 automatically increments its value by one each time the modem receives a ring while in the command state. **S1** is reset to zero if no ring is detected within **8** seconds.

Range: 0 - 255 rings
Default: 0

S2 ASCII Value of Escape Character

S2 stores the ASCII value of the escape character. Setting register **S2** to a value greater than 127 disables the escape command and you cannot return to the command state. With escape disabled, in the on-line state the modem cannot hang up until the power is turned off or the remote modem hangs up.

Range: 0 - 127, ASCII decimal.
Default: 43 (+)

S3 ASCII Value of Carriage Return

S3 stores the ASCII value of the carriage return character. (Pertains to asynchronous operation only.)

Range: 0 - 127, ASCII decimal.
Default: 13

S4 ASCII Value of Line Feed Character

S4 stores the ASCII value of the line feed character, if your computer does not recognize the default as a line feed, change the value. A value greater than 127 disables the line feed. When disabled, the line feed character that precedes or follows a result code is canceled.(Pertains to asynchronous operation only.)

Range: 0 - 127, ASCII decimal.
Default: 10 (Line Feed)

S5 ASCII Value of Backspace Character

S5 stores the ASCII value of the backspace character. The backspace is used to edit a command line. If your computer does not recognize the default as a backspace, change the value. (Pertains to asynchronous operation only.)

Set **S5** to any value from 0 to 31 or 127. Do not set it to any value from 32 through 126 because these values correspond to printable ASCII characters. A value greater than 127 disable the backspace and makes it impossible to edit a command line.

Range: 0 - 127, ASCII decimal.
Default: 8 (Backspace)

S6 Wait Time before Blind Dialing

S6 controls how long the modem waits after it goes off-hook before it dials the first digit of the telephone number. The modem always pauses for at least 2 seconds, even if **S6** is set to less than two seconds.

Range: 2 - 255 seconds.
Default: 2
(Default)

S7 Wait for Carrier after Dial

S7 controls how long the modem waits for a carrier signal from a remote modem after originating a call or from the calling modem after going off-hook when answering a call.

S7 also controls how long the modem waits for a one-second continuous dialtone after dialing a number followed by the **W** dial modifier. If the modem detects a one-second continuous dialtone within the specified wait time, it proceeds to dial.

Range: 1 - 255 seconds.
Default: 50

S8 Pause Time for Comma

S8 controls how long the modem pauses when a comma "**,** " is encountered in a dial string while executing a dial command.

Range: 0 - 255 seconds.

Default: 2

S9 Carrier Detect Response Time

S9 determines how long a carrier signal must be present for the modem to confirm it. The longer the response time, the easier it is for the modem to correctly recognize a carrier without mistaking other signals or transient noise on the line as a carrier.

Range: 1 - 255 tenths of a second.
Default: 6 (0.6 second)

S10 Delay between Loss of Carrier and Hang-Up

S10 determines the delay time between the loss of a carrier from the remote modem and hang-up. This allows for a temporary loss of carrier without causing the local modem to disconnect. When **S10** is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in **S10** minus the value in **S9**. Therefore, the value in **S10** must be greater than that in **S9**, or else the modem disconnects before it recognizes the carrier.

Range: 1 - 255 tenths of a second.
Default: 14 (1.4 seconds)

S11 DTMF (Touch-tone) Tone Duration

S11 determines the duration and spacing of tones for Dual Tone Multifrequency (DTMF) dialing. This value has no effect on pulse dialing.

Range: 50 - 255 milliseconds.
Default: 95

S12 Escape Guard Time

S12 determines the escape guard time. The escape guard time is the minimum waiting time required before and after entering the escape code (three consecutive escape characters) in the on-line state. It is also the maximum waiting time allowed between any two consecutive escape characters. If the waiting time before or after the escape code is shorter than the guard time, or if the waiting time between consecutive escape characters is longer than the guard time, then the modem does not recognize the escape command and stays on-line.

If the escape guard time is set at 0 second, it is impossible to return the modem to command state.

Range: 0 - 255 1/50 of a second.
Default: 50 (1 second)

S13 Reserved

S14 Reserved

S15 Reserved

S16 Reserved

S17 Reserved

S18 Test Timer

The test timer determines how long tests are performed. The modem automatically ends the test when the test time is expired. The default value of 000 disables the test timer. When the timer is thus disabled, all tests must be ended with the &T0 command.

Range: 0 - 255 seconds.
Default: 0

S19 Reserved

S20 Reserved

S21 Reserved

S22 Reserved

S23 Reserved

S24 Reserved

S25 Delay to DTR

S25 serves two purposes. When the modem is operating in synchronous mode 1, the value assigned to **S25** specifies the length of time the modem waits after a connection has been made before examining DTR. This allows the modem to ignore an ON-to-OFF transition of DTR, giving the user time to disconnect the modem from the asynchronous terminal and attach it to a synchronous terminal, without forcing the modem back to the asynchronous command mode. During this time, the value for **S25** is read in whole seconds.

In all other modes, and after call establishment in synchronous modes I and 4, the value is read in 1 /100 seconds. In any mode, a change in DTR (ON or OFF) that persists for a period shorter than the value held in **S25** is ignored by the modem while it is in data mode.

Range: 0 - 255 (1 second for synchronous mode 1;
0.01 second otherwise)

Default: 5

S26 Reserved

S27 Reserved

S28 Reserved

S30 Inactivity Disconnect Timer

This register determines the length of time, in seconds, the modem waits before disconnecting when no data is sent or received. This only operates in &Q5 and &Q6 modes, a value of 0 in this register disables the timer.

Range: 0 - 255 tenths of a second
Default: 0 (disable)

S32 XON Character

Range: 0 - 255, ASCII decimal
Default: 17

S33 XOFF Character

Range: 0 - 255, ASCII decimal
Default: 19

S34 56K Data Rate (bit-rate)

Set the maximum bit rate for 56K.

Range: 0 - 32
bit rate = 32000bps + S34 * 2000bps

V.34 Data Rate (bit-rate)

Set the maximum bit rate for V.34.

Range: 0 - 8(2400 baud)
1-10(3000 baud)
1-11(3200 baud)
1-13(3429 baud)
bit rate = ((S34) + 1) * 2000bps
Default: 13 (33600 bps)
(Default)

S35 V.34 Symbol Rate(baud-rate)

Set the maximum baud rate for V.34.

Range: 0 - 5
0 - 2400 baud
1 - 2743 baud (N/A)
2 - 2800 baud (N/A)
3 - 3000 baud
4 - 3200 baud
5 - 3429 baud (N/A until V.34bis)
Default: 0 (2400 baud)

S36 Reserved

S37 Desired Line Connection Speed

Default: 0

Desired line connection speed. This is interlinked with the Fn command. If an invalid number is entered, the number is accepted into the register, but S37 will act as if the default value has been entered.

0 = Attempt to connect at the highest speed. (default)
3 = Attempt to connect at 300 bps.
4 = Attempt to connect at 1200 bps.
6 = Attempt to connect at 2400 bps.
7 = Attempt to connect at 4800 bps.
8 = Attempt to connect at 7200 bps.
9 = Attempt to connect at 9600 bps.
10 = Attempt to connect at 12000 bps.
11 = Attempt to connect at 14400 bps.
12 = Attempt to connect at V.34.

S38 Delay Before Forced-Disconnect

This register controls how long the modem waits, after receiving the ATH command or loss of DTR, before it disconnects from the telephone line. When connected in an error-corrected mode, you can use this register to ensure that all data is transmitted from the modem's buffer before the modem disconnects.

If you set S38 between 0 and 254, the modem waits that number of seconds for the remote modem to acknowledge all data before it disconnects. If you set S38 to 255, the modem waits indefinitely for the remote modem to acknowledge all data.

Range: 0 - 255 seconds
Default: 0 (Default)

S39 Reserved

S40 Reserved

S41 Reserved

S42 Reserved

S43 Reserved

S44 Reserved

S45 Reserved

S46 Reserved

S47 Reserved

S48 Reserved

S82 Reserved

S86 Call Failure Reason Code

0 - Normal disconnect; no error.
4 - Loss of carrier.
5 - V.42 negotiation failed to detect an error correction modem at remote end.
6 - No response to complete negotiation.
9 - No common protocol.
12 - Remote initiated a normal disconnect.
13 - Remote modem did not respond after 10 message retransmissions.
14 - Protocol violation.
15 - Compression failure.
20 - Hang up by inactivity time out.

S91 PSTN Transmit Attenuation Level

Sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode resulting in a transmit level from 0 to -15 dBm.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level).
Default: 11 (-10 dBm transmit level).

3 - TROUBLE SHOOTING

This chapter describes common problems in the installation, configuration and regular usage of your Fax/Data Modem. To test the Fax/Data Modem, a communication software package is needed and the package must include a mode that allows you to operate your Fax/Data Modem by directly issuing internal commands to the modem.

Follow the procedures in the following sections to resolve these common problems:

No Response From Your Modem

1. If you are using the internal add-on card modems, make sure that the COM port address you have set your modem to corresponds to the appropriate selection in the communications software which you are using.

2. Issue the **ATZ** command to reset your modem. The returned result code should be "0" or "OK" depending on what communications program you are using. Your modem is OK if you get one of these responses. If there is no response after issuing the **ATZ**<CR>, continue to the next step.

3. Check if there are any other interface cards in your computer that use the same COM port address as your modem. If so, you must set your modem to another COM port address. (Keep in mind that on most systems, only two COM ports are available. One of them must be used as either 1 or 3, while the other must be used as 2 or 4.) For example, if a mouse is set to COM 1, your modem should be set to COM2 or COM4. Continue to the next step if the COM port address is OK.

4. Issue the command: **AT&F&W** <CR>, if a "0" or "OK" result code is displayed on the screen, your modem is OK. Otherwise, contact your dealer for assistance.

Your Modem Does Not Dial Out

Make sure that your modem responds normally. If you can communicate through the keyboard, check whether the modem is properly connected to the phone line.

Your Modem Does Not Connect After It Has Dialed a Phone Number

The problem may have several causes. The phone line may be too noisy or the telephone cord may be poor. Try the line with a regular phone. Also the remote modem may not recognize your modem's baud rate.

Your Can't Transmit After You Have Connected to the Remote Modem

In this case, check the communication parameters of the remote modem, then configure your software to the same number of data bits, stop bit, and parity.

4 - APPLICATION EXAMPLES

4.1 Dialing a Remote Modem

Command line: ATDP9WT002, (886)-7128423<CR>

This command line instruct the modem to dial a remote modem through a PBX. The modem first use pulse dialing to dial 9 (the access code of the PBX), wait for outside dial tone, and then use touch tone dialing to dial 002 once a one-second continuous dial tone is detected within 30 seconds, pause for 2 seconds (if S8=2) and then dial 8867128423.

4.2 Dial a Stored Number

Command line: **AT&Z2=T03,709394<CR>**

Command line: **ATDS=2<CR>**

The first command line store the dial string T03, 709394 to the 3rd location in NVRAM. Afterwards you can use the second command line to dial this stored number. The dial string T03, 709394 will appear on the screen to indicate the number being dialed.

4.3 Manual Answer an Incoming Call

Command line: **ATA <CR>**

The factory setting of the S-register S0 is S0=0. This condition disables the auto answer capability so that you must issue an ATA command to answer a call. At power up, your modem always monitors if there are incoming rings. If incoming rings are detected, your modem will display result codes on the screen as :

RING
:
:
RING

Seeing that, you may issue the ATA command to answer the call. This command must be entered within the quiet interval between any two rings.

4.4 Auto Answer an Incoming Call

Command line: **AT S0=2 &W &Y <CR>**

Auto answer can be enabled by changing the setting of the S-register S0 to a value between 1 and 255. In the above command line, S0=2 instructs the modem to answer an incoming call automatically after the 2nd ring. The &W command writes this configuration to profile 0 in NVRAM. &Y command instruct the modem to load profile 0 as the active configuration on power-up. The last two commands make S0=2 the default value at power-up or reset.

This example also shows the insertion of space between two neighboring commands to make the command line more readable.

4.5 Voice to Data Switching

Command line: **ATA <CR> or ATX1D <CR>**

If you are talking with a remote modem user through the telephone set and want to initiate data communication with the remote modem, follow the procedures below:

1. You or the remote user issue an ATA command first to switch to data communication.

2. When the person on the other end hears an answer tone from the phone, issues an ATX1D command (X1 to disable the dial tone monitor) to instruct the modem to go off-hook and wait for a carrier. If connection is successful, the CONNECT XXXX result code will be displayed on the screen. Now you can hang up your phone and begin data communication with the remote modem.

A - CALLER ID COMMANDS(Option)

#CIDn Caller ID(Enables or Disables Caller ID)

This command only apply to models which support the Caller ID function.

#CID=0 Disables Caller ID. (Default)

#CID=1 Enables Caller ID with formatted presentation to the DTE. The modem will present the date items in a <Tag><Value> pair format. The expected pairs are data, time, caller code (telephone number), and name.

#CID=2 Enables Caller ID with unformatted presentation to the DTE. The modem will present the entire packet of information, excluding the leading U's, in ASCII printable hex numbers.

Result Codes:

OK n=0 or 2.
ERROR Otherwise.

Inquiries:

#CID? Retrieves the current Caller ID mode from the modem.

#CID=? Returns the mode capabilities of the modem in a list with each element separated by commas.

Formatted Form Reporting

The modem presents the data in the <tag>=<value> pair format as described in the table below. Spaces are present on both sides of the equal sign.

TAG **Description**
DATE DATE=MMDD where MM is the month number (01 to 12) and DD is the day number (01..31).

TIME TIME=HHMM where HH is the hour number (00 to 23) and MM is the minute number (00 to 59).

NMBR NMBR=<number> or P or O where <number> is the telephone number of the caller, where P indicates that the calling number information is not available since the orginating caller has requested private service, and where O indicates that the calling number information is not available or out of service at the calling location.

NAME NAME=<listing name> where <listing name> is the subscription name.

MESG MESG=<data tag><length of message><data><checksum> in printable ASCII hex numbers. This tag indicates a data item not listed above. The message is only possible for Multiple Message Format.

Notes:
1. The modem does not present any Caller ID information if the DCE detects a checksum error in the Caller ID packet.

2. In the event of an unrecognized data tag, the modem will present the data in ASCII hex numbers following the MESG tag.

Example of Formatted Form Reporting

1. The following example illustrates the standard Caller ID message packet.

RING

DATE=0321
TIME=1405
NMBR=504551234
NAME=ANOTHER

RING

RING

2. The following example illustrates the case where the tag of the packet is not recognized by the modem.

RING

MESG=06034242431

RING

RING

Unformatted Form Reporting

The modem presents all information and packet control information found in the message. The modem, however, excludes the leading U's. (Channel seizure information) from the presentation. The packet is presented in ASCII printable hex munbers, the modem does not insert spaces, or line feeds, for formatting between bytes or words of the packet. The modem does not detect the checksum of the packet.

Example of Unformatted From Reporting

RING

0412303332323234303539313435353132333435

RING

RING

Features

Data Rates(bps)
56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333, 40000, 38667,37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000 bps (ITU-T V.90 receive only)
56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000 bps. (K56Flex receive only)
33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 300bps

Compatibility
(Data)
ITU-V.90, ITU-T V.34, V.32 bis, V.32, V.22 bis, V.23, V.22, and V.21
Bell: 212A and 103, Rockwell V.Fast Class, K56flex

(Fax)
ITU-T V.17, V.29, V.27 ter, and V.21 ch 2

Command Set
Enhanced 'AT' command set, Fax Class 1 command

Flow Control
Xon/Xoff, Hardware RTS/CTS

Data Compression
V.42bis, MNP5

Error Correction
V.42, MNP 2-4

General Features
Auto Fallback
AT Commands
Auto Selection of COM Port and IRA settings
Automatic Answering
Signal Quality Monitoring and Auto Retrain
Single Crystal Design
Data/Fax/Voice Auto Detection
Automode
High throughput Virtual UART, DTE rate up to 115200 ISA Bus Interface
Low Power Consumption

Opearting System Compatibility
Windows 95
Windows 98
Windows NT 4.0

Operation
Full-or Half-duplex 56000bps with 54667, 54000, 53333, 52000, 50000 ,50667, 49333, 48000, 46667, 46000, 45333, 44000, 42667, 42000, 41333, 40000, 38667, 38000, 37333, 36000, 34667, 34000, 33600, 33333, 32000, 30667, 31200, 29333, 28000, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, and 300bps auto fallback

Test Modes
Analog loopback, local digital loopback, and remote digital loopback

Modulation

Data	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333, 40000,38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000 bps (ITU-T V.90 receive only) 56000bps, 54000bps, 52000bps, 50000bps, 48000bps 46000bps, 44000bps, 42000bps, 40000bps, 38000bps, 36000bps, 34000bps, 32000bps. (K56Flex receive only)	PCM
	33600, 31200, 28800, 26400, 24000, 21600, 14400, 9600, 7200bps	TCM
	9600, 4800bps	TCM
	2400, 1200, 600bps	TCM
	1200TX/75RX, 75TX/1200RX, 300bps	FSK
Fax	14400, 9600, 7200, 4800bps	QAM
	4800, 2400bps	QAM

Audio Monitor
Built-in speaker, with software-controllable volume control

Guard Tone
550/1800 Hz

Compatibility:

	Data	ITU-V.90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333, 40000,38667,37333, 36000, 34667, 33333, 32000, 30667 29333, 28000 bps (ITU-T V.90 receive only)
		K56flex	56000/54000/52000/50000/48000/46000/44000/42000/ 40000/38000/36000/34000/32000 (K56Flex receive only)
		V.Fast Class	28800/26400/24000/21600/19200/16800/14400
		V.34	33600/31200/28800/26400/24000/21600/19200/16800/14400
ITU-T V.32bis		14400/9600 bps, asynchronous, synchronous	
		ITU-T V.32	9600/4800 bps, asynchronous, synchronous
		ITU-T V.22 bis	2400/1200 bps, asynchronous, synchronous
		ITU-T V.23	1200/75 bps, asynchronous, synchronous
		ITU-T V.22	1200 bps, asynchronous, synchronous
		ITU-T V.21	300 bps, asynchronous
		Bell 212A	1200 bps, asynchronous, synchronous
		Bell 103	300 bps, asynchronous
	Fax	ITU-T V.17	14400/9600 bps, half-duplex
		ITU-T V.29	9600/7200 bps, half-duplex
		ITU-T V.27 ter	4800/2400 bps, half-duplex
		ITU-T V.26 bis	2400/1200, half-duplex
		ITU-T V.26 A	2400, half-duplex
		G - III	(Group 3 fax)

Compliance
FCC 15&68

Command Buffer
40 characters

Extra Memory
4 x 36 digits

Transmit Level
-11(+/-1)dBm

Receive Sensitivity
-40dBm

B - QUICK REFERENCE

A Go On-line in Answer Mode

Bn Select Protocol to 300 bps or 1200 bps

Cn Carrier Transmit Control

D Go On-line in Originate Mode

En Command Echo

Hn Hang Up

In Identification

Mn	Monitor Speaker On/Off
Nn	Automode Enable
On	Return to On-line Data Mode
Qn	Result Code Display
Sn	Reading and Writing to S Registers
T	Set Tone Dial as Default
Vn	Select Word or Digit Result Codes
Wn	Negotiation Progress Reporting
Xn	Extended Result Codes
Yn	Enables or Disables Long Space Disconnect
Zn	Reset
&Cn	Select DCD Options
&Dn	DTR Option
&Fn	Fetch Factory Configuration
&Gn	Set Guard Tone
&Kn	DTE/Modem Flow Control
&Sn	DSR Option
&Vn	View Configuration Profiles
&Wn	Store the Current Configuration to Nonvolatile RAM
&Yn	Select the Default Profile
&Zn	Store Telephone Numbers (n=0 to 9)
\An	Select Maximum MNP Block Size
\Bn	Transmit Break to Remote
\Gn	Modem to Modem Flow Control (XON/XOFF)
\Kn	Break Control
\Nn	Operating Mode Control
%Cn	Enable/Disable Data Compression

%En Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward

%Q Line Signal Quality

@ Answer

, Pause

! Initiate a Hookflash

; Return to Command State after Dialing

^ Tone Control

L Re-dial Last Number

S Dial a Stored Number

T Touchtone Dialing

W Wait for Dialtone

A/ Repeat Command

+++ Escape

C - GLOSSARY

ASCII - An acronym for American Standard Code for Information Exchange. ASCII is a seven-bit code which defines 128 standard characters, including control characters, letters, numbers, and symbols. An extra 128 characters comprise the extended ASCII set.

Baud Rate - The transmission rate between two serial devices, e.g., modems, fax machines, etc. Measured in Bits Per Second.

Blind Dialing - In blind dialing, the modem continues to dial, regardless of the existence of a dialtone, ring, or busy signal.

BPS - Bits Per Second; the number of bits that can be transmitted in one second.

Carrier Signal - The analog data signal that a modem sends over telephphone wires.

COMx - Where (x = 1, 2, 3, or 4), COMx is the name(address) of serial communications ports on personal computers. Each serial port in a personal computer has a different number.

CTS - Clear To Send.

Default - The assumed value that is used for a command parameter when no other value is explicitly provided.

DCD - Data Carrier Detect.

DCE - Data Communication Equipment.

DTE - Data Terminal Equipment.

DTMF - Dual Tone Multifrequency(for touchtone dialing).

DTR - Data Terminal Ready.

FSK - Frequency Shift Keying.

Make/Break Ratio - The ratio of the off-hook (make) to on-hook (break) interval is the make/break ratio in pulse dialing.

Modem - A combination of the words MOdulator and DEModulator. Modems transform digital data into analog signals and back again.

Nonvolatile Memory - An area of memory inside the modem where the default configuration profile is stored. Values recorded in this memory will not be lost when the power is turned off.

Off-Hook - The condition when the modem has picked up the telephone line.

Off-Line Command State - A modem state in which the modem accepts, interprets and executes commands from an asynchronous computer or terminal.

On-Hook - The condition when the modem has not picked up the telephone line; the telephone is hung up.

On-Line - A carrier signal link with a remote modem has been established; communication is in progress.

On-Line State - A modem state in which the modem is connected with a remote modem. Data can be sent or received from the remote modem in this state. No commands will be accepted from the modem except the escape command which will bring the modem into the on-line command state.

On-Line Command State - A modem state in which the modem can accept or execute commands from an asynchronous computer or terminal while remaining connected with the remote modem. The user can return the modem to the on-line state by issuing the **AT0n** command or put it into the off-line command state by issuing command such as **ATZ** or **ATH**.

Parity - An error-checking method by which the modem verifies that the data just sent is correct.

pps - Pulse per second.

Profile - A list of default settings.

Protocol - A technical specification for serial communications; the protocols supported by the modem are listed in Appendix A.

PSK - Phase Shift Keying.

Pulse Dialing - A dialing form in which each digit is represented by a series of pulses. Rotary telephones all use pulse dialing.

QAM - Quadrature Amplitude Modulation.

Result Codes - The response the modem returns to the screen upon executing a command.

RAM - Random Access Memory.

ROM - Read-Only Memory. A chip inside the modem which stores the factory default settings. This memory cannot be changed.

RTS - Request To Send.

RX - Reception.

S Register - RAM locations in the modem which store the active configuration.

Serial Port - See COMx.

TCM - Trellis-Coded Modulation.

Touchtone Dialing - A dialing format in which each digit is represented by a musical frequency.

TX - Transmission.

D - ASCII CODE TABLE

Decimal	Hex	Value	Decimal	Hex	Value	Decimal	Hex	Value	Decimal	Hex	Value
000	00	NUL	032	20	(space)	064	40	@	096	60	'
001	01	SOH	033	21	!	065	41	A	097	61	a
002	02	STX	034	22	"	066	42	B	098	62	b
003	03	ETX	035	23	#	067	43	C	099	63	c
004	04	EOT	036	24	$	068	44	D	100	64	d
005	05	ENQ	037	25	%	069	45	E	101	65	e
006	06	ACK	038	26	&	070	46	F	102	66	f
007	07	BEL	039	27	'	071	47	G	103	67	g
008	08	BS	040	28	(	072	48	H	104	68	h
009	09	HT	041	29	)	073	49	I	105	69	i
010	0A	LF	042	2A	*	074	4A	J	106	6A	j
011	0B	VT	043	2B	+	075	4B	K	107	6B	k
012	0C	FF	044	2C	,	076	4C	L	108	6C	l
013	0D	CR	045	2D	-	077	4D	M	109	6D	m
014	0E	SO	046	2E	.	078	4E	N	110	6E	n
015	0F	SI	047	2F	/	079	4F	O	111	6F	o
016	10	DLE	048	30	0	080	50	P	112	70	p
017	11	DC1	049	31	1	081	51	Q	113	71	q
018	12	DC2	050	32	2	082	52	R	114	72	r
019	13	DC3	051	33	3	083	53	S	115	73	s
020	14	DC4	052	34	4	084	54	T	116	74	t
021	15	NAK	053	35	5	085	55	U	117	75	u
022	16	SYN	054	36	6	086	56	V	118	76	v
023	17	ETB	055	37	7	087	57	W	119	77	w
024	18	CAN	056	38	8	088	58	X	120	78	x
025	19	EM	057	39	9	089	59	Y	121	79	y
026	1A	SUB	058	3A	:	090	5A	Z	122	7A	z
027	1B	ESC	059	3B	;	091	5B	[	123	7B	{
028	1C	FS	060	3C	<	092	5C	\	124	7C	|
029	1D	GS	061	3D	=	093	5D	]	125	7D	}
030	1E	RS	062	3E	>	094	5E	^	126	7E	~
031	1F	US	063	3F	?	095	5F	_	127	7F	DEL